Chapter I2: Technical Description of Monroe

This chapter presents technical information related to the case study facility. Section I2-1 presents detailed Energy Information Administration (EIA) data on the generating units addressed by this case study and in scope of the Phase II rulemaking. Section I2-2 describes the configuration of the facility's intake structures.

CHAPTER CONTENTS

I2-1 Operational Profiles

Baseline operational characteristics

The Monroe power plant operates nine units. Four are coal-fired steam electric units (Units 1-4) that use cooling water withdrawn from the River Raisin while five units (Units IC1-IC5) are oil-fired internal combustion turbines that do not require cooling water. The internal combustion turbines began operation in 1969 while the four coal units began operation between June 1971 and May 1974.

Monroe's total net generation in 1999 was 18.3 million MWh. The four steam turbine units (Units 1-4) had capacity utilization rates between 50.4 and 73.3 percent. Table I2-1 presents details for Monroe's nine units.

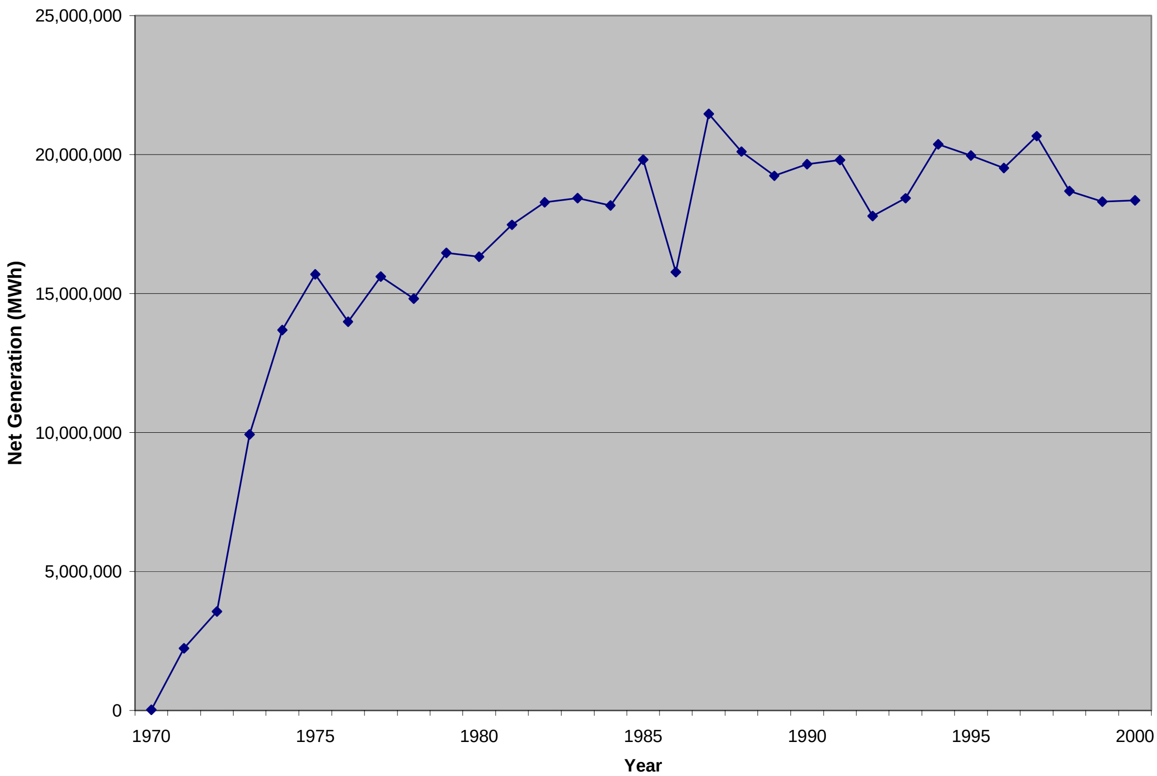
Table I2-1: Generator Detail of the Monroe Plant (1999)

Generator ID	Capacity (MW)	Prime Mover[a]	Energy Source[b]	In-Service Date	Operating Status	Net Generation (MWh)	Capacity Utilization[c]	ID of Associated CWIS
1	817	ST	BIT	June 1971	Operating	4,667,517	65.2%	1
2	823	ST	BIT	March 1973	Operating	3,633,349	50.4%	2
3	823	ST	BIT	May 1973	Operating	4,755,872	66.0%	3
4	817	ST	BIT	May 1974	Operating	5,249,776	73.3%	4
IC1	2.8	IC	FO2	Nov. 1969	Operating	1,916	1.6%	Not Applicable
IC2	2.8	IC	FO2	Dec. 1969	Operating			
IC3	2.8	IC	FO2	Nov. 1969	Operating			
IC4	2.8	IC	FO2	Dec. 1969	Operating			
IC5	2.8	IC	FO2	Nov. 1969	Operating			
Total	**3,293**					**18,308,430**	**63.5%**	

[a] Prime mover categories: ST = steam turbine; IC = internal combustion turbine.
[b] Energy source categories: BIT = bituminous coal; FO2 = No. 2 fuel oil.
[c] Capacity utilization was calculated by dividing the unit's actual net generation by the potential generation if the unit ran at full capacity all the time (i.e., capacity * 24 hours * 365 days).
Source: U.S. Department of Energy, 2001a, 2001b, 2001d.

Figure I2-1 below presents Monroe's electricity generation history between 1970 and 2000.

Figure I2-1: Monroe Net Electricity Generation 1970 -2000 (in MWh)



Source: Form EIA-906.

I2-2 CWIS Configuration and Water Withdrawal

The Monroe Power Station is located at the mouth of the River Raisin, approximately 2000 ft upstream from the open water of western Lake Erie. Monroe currently employs two intake structures that supply cooling water to the facility's once-through cooling system. Water from the River Raisin is diverted down a man-made intake canal to the intake structures. The first intake structure is 330 feet from the canal opening, while the second structure is 880 feet from the opening. Both structures share the same design and technology configuration.

Intake water drawn into one of the two structures passes through trash racks consisting of vertical bars spaced 7.6 cm apart and under a skimmer wall to one of the eight intake bays. Each intake bay contains fish collecting pans and guide screens that divert most impingeable organisms to a fish pump. Fish pumped out of the intake canal are deposited in a fish return pipe 20 cm in diameter. The return pipe expands to 66 cm in diameter downstream from the diversion point. Diverted fish are returned to Lake Erie at the end of a rocky jetty. Intake water not diverted with pumped fish passes through a vertical traveling screen to the circulating pumps and through the condenser. Traveling screens are rotated every eight hours, except during periods of high impingement. Heated water returns to the River Raisin via a discharge canal located to the west of the main powerhouse.

At maximum capacity, the Monroe Power Plant can withdraw 1,975 MGD through its two cooling water intake structures, representing 4 times the mean annual flow of the source water, the River Raisin. Because of the proximity of the intake canal to Lake Erie (~2000 ft.) and the large volume of water required for cooling operations at the facility, Monroe often draws water from Lake Erie up the mainstem of the river to the intake canal. Seasonal variations (spring flood) prevent this from occurring on a daily basis.

During the 1970s, Detroit Edison evaluated a fish pump and return system at its Monroe facility for its ability to reduce the impingement of aquatic organisms. Data from a 1977 316(b) demonstration study indicate a diversion rate associated with the fish pumps of 95 percent, meaning 95 percent of the fish passing through the trash racks into the main portion of the intake structure were successfully diverted through the return system to Lake Erie. The survival rate of diverted fish is unclear. Given the nature of the diversion (mechanical pumps), the distance of the return pipe (~2000 ft.), and the differences between the original and terminal environments (River Raisin vs. Lake Erie), it is reasonable to assume that some number of diverted fish do not survive for an extended period of time after the return to Lake Erie. However, there have been no studies of long-term survival.

No technologies are currently in place to reduce entrainment mortality.